

**FUNCTIONAL OUTCOME AFTER TOTAL
KNEE REPLACEMENT IN SOUTH INDIAN WOMEN**

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I dedicate this thesis (Functional out come after total knee replacement in South Indian Women) to my Teachers.

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INTRODUCTION

Total Knee Arthroplasty has become a standard operative procedure to relieve pain and restore function in patients with disabling arthritis of the knee.

It not only provides pain relief but also corrects deformity improves function and quality of life⁽¹⁾. Several studies have been conducted on the outcome of total knee replacement and the results have been very encouraging⁽²⁾.

High Tibial Osteotomy is one of the methods of treatment for Osteo Arthritis. But it is only a palliative treatment. It does not correct the Pathology in the Knee joint.

Whereas total knee replacement corrects and eliminates the Pathology in the knee joint.

Even though Osteo Arthritis Knee equally affects both Male and Female population, it is much more common among women. Probably household activities may be one of the important causes for this ailment.

So, I have selected the topic “Functional Outcome After Total Knee Replacement” in South Indian women. Further the quality of life is quite satisfactory after total knee replacement.

In this series 21 patients were treated for 22 knees (one case Bilateral).

Aims and Objectives

It is to confirm that Total knee replacement gives good result (Functional ability and better quality of life).

AIM AND OBJECTIVES

To assess functional outcome after total knee replacement in South Indian Women. This includes the improvement in quality of life. The Psychological uplift is also assessed.

Majority of patients after Total Knee Replacement are near Normal.

ANATOMY AND BIOMECHANICS OF KNEE

Bony Architecture

Knee joint is a modified hinge joint because its motion is more complex. Knee consists of femur/tibia and patella and has 3 compartments – medial/lateral/patella femoral. Distal femur has 2 asymmetric cam shaped condyles. Medial condyle is larger in its anteroposterior diameter and is 1.7 cms longer than lateral condyle in its outer circumference and also has a more asymmetric curvature. Lateral condyle has a curve of sharply decreasing radius posteriorly.

Vertical axis of lateral condyle is longer than medial and is more in line with femoral shaft. Medial condyle takes an angle of 22° to the shaft. The two condyles are separated by intercondylar fossa which lies within the joint capsule but is largely extrasynovial. Its lateral wall gives attachment to posterior cruciate ligament. Intercondylar line gives attachment to capsular ligament and oblique popliteal ligament of Winslow.

Proximal tibia also ends in condyles which are covered with articular cartilage on superior aspect. The medial condyle of tibia is larger and wider than lateral condyle and has a squared off posterior surface. Lateral condyle is narrow and slopes posteriorly at an inclination of approximately 10°. Articular surface of medial condyle is flatter than the lateral condyle. Central area of tibia plateau is occupied by medial and lateral tibia eminences or spines. Medial spine projects more superiorly than lateral (AP view) and is also anterior to lateral spine (Lateral view). They have a role in mediolateral stability of the knee.

Anterior intercondyloid fossa is a depression on superior and central portion of tibia where anterior horn of medial meniscus, ACL and anterior horn of lateral meniscus coalesce. Anteriorly the most prominent structure is the tibial tuberosity which gives insertion to patellar tendon. Pes anserinus (confluent tendon of Sartorius/gracilis / semitendinosus) is medial to tibial tubercle, 2-3 cms lateral to tibial tubercle lies the gerdyis tubercle to which the iliotibial band inserts. The incongruity between tibial and femoral joint surfaces and passive constraint provided by their ligamentous and soft tissue attachments account for the “screw home” mechanism as femur rotates medially on the loaded tibia to lock knee in extension.

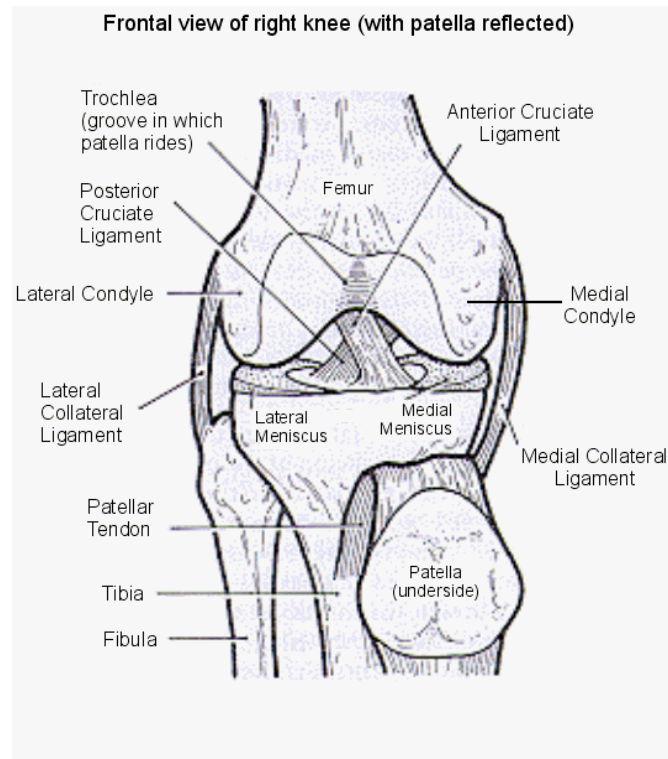
Patella

It is the largest sesamoid bone in the body and has the thickest articular cartilage in the skeletal system. It is oval with apex distally and is embedded in the quadriceps tendon whose fibres course over it anteriorly coalescing to form the patellar ligament. Ventral surface is triangular and apex is inferior which articulates with trochlea. The articular surface of patella is divided by a median ridge into lateral and medial facets and both the facets are again divided into 6 facets each (total 7 facets). The 7th or odd facet lies at extreme medial border of patella and makes contact at 135 degrees flexion and beyond.

Capsule

On the femur it is attached to the articular margins. Anteriorly its attachment is 3-4 finger breadths above the patella. On tibia it is attached along the articular margins. On the lateral aspect the popliteal tendon crosses it where it

becomes prolonged, draping downward to head of fibula. This redundant portion of capsule is known as arcuate ligament. The capsule communicates above patella with a large suprapatellar pouch.



Ligaments

Cruciates

Anterior cruciate ligament and Posterior cruciate ligament are tough fibrous structures essential to normal knee motion and stability. These are intraarticular and extrasynovial. They are named for their tibia attachments.

ACL

On an average the ACL is 38mm in length and 7-12mm in width. Its femoral attachment lies posteriorly in intercondylar notch on its lateral wall as a semicircle coated 250 from long axis of femoral shaft. It courses anteriorly,

distally and medially to attach on anterior intercondyloid fossa lateral and posterior to medial meniscus and lateral to anterior tibia spine.

The femoral attachment takes the form a semicircle with a convex portion directed posteriorly and straight portion anteriorly. Tibial attachment is stronger, more extensive and it takes a slight outward spiral. Attachment is approximately 30mm in length and extends to anterior horn of lateral meniscus.

ACL has 2 portions – anteromedial band and a large, thicker posterolateral band. Due to its nature of femoral and tibial attachments, different portions of ligament become taut as knee goes through a range of motion. As knee flexes, anteromedial band tightens, providing primary restraint to anterior tibial translation and accounts for 86% of total resisting force to anterior drawer.

In extension, posterolateral bundle becomes taut in extension, Maximum tensile strength of ACL is 1,725 +/- 200 newtons.

PCL

It is twice stronger than ACL. Femoral attachment is at the medial wall of intercondylar notch and is also in the form of a semicircle with a horizontal border superior and convex border inferior and parallel to curve of medial femoral condyle. There are 2 bundles in PCL based on its origin of femur and insertion of tibia. Anterolateral bundle originates on anterior aspect of femur and inserts on lateral aspect of tibia pad.

Posteromedial bundle originates posterior to the anterolateral bundle and inserts medial to it on the tibia. Anterolateral bundle is 11 mm posterior to anterior femoral articular surface and high in the notch. Its tibia insertion is 10mm distal to joint line.

PCL length -38, Width -13mm, Girgis et al. PCL sends fibres that blends with posterior horn of lateral meniscus. Anterior fibers are taut in flexion, lax in extension whereas posterior fibres are vice versa. PCL provides 95% of total restraint to posterior displacement of tibia on femur. It is maximally taut at full flexion. PCL along with LCL and popliteal tendon stabilize the posterolateral corner and posterior aspect of knee. Blood supply to PCL/ACL is through middle geniculate (branch of popliteal artery).

Menisci

These are curvilinear fibro cartilaginous structures consisting of interlacing networks of collagen bundles. It consists of 70% collagen, 10% noncollagenised protein 10% GAG and glycoprotein. Predominant type of collagen i.e. 90% is type –I.

Medial meniscus

It is 3/5th of a ring, wider and thicker at its posterior horn, wider outer margin with a tapering free edge internally. Anterior horn of medial meniscus inserts first anterior to origin of medial tibia spine, posterior horn attaches just posterior to descending portion of spine in front of PCL attachment.

Lateral meniscus

It is 4/5th of a ring and is more uniform in shape. Anterior horn inserts first anterior to lateral tibia spine and posterior horn to its descending portion and in front of posterior attachment of medial meniscus. It has no capsular attachments and hence greater mobility. Horns of menisci are attached to each other by transverse ligament anteriorly.

Superficial Medical Collateral Ligament

Is a 4" long, 1/2" broad, flat tough triangular structure which extends from medial epicondyle of femur and attaches distally on tibia about 4-6 cms below joint line, posterior and deep to pes anserinus on the posteromedial aspect. It is phylogenetically an analog of Adductor magnus. Superior MCL is a primary restraint against valgus stress, external rotation of tibia on femur and a weak restraint to anterior tibia translation in absence of ACL. Parallel fibres of MCL become taut between 45-90° of flexion.

Lateral Collateral Ligament

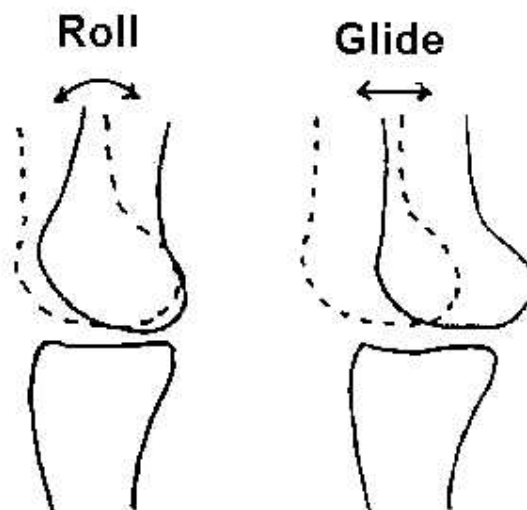
It is 2" long tough structure which extends from lateral epicondyle of femur above popliteal groove to head of fibula where it is embraced by tendon of biceps femoris.

Morphologically it represents femoral attachment of peroneus longus. LCL provides 69.2% of resistance to varus rotation at 25° flexion (Grood and Colleagues).

Basic Knee Biomechanics

Analysis of biomechanism includes analysis of surface motion at knee. To describe this, the concept of 'instantaneous centre of motion' or instant centre was described by Frankel et al. This describes the portion of femoral and tibia articulating surfaces during flexion and extension of knee. This is a large point that exists only for a brief time. As 2 bodies move relative to one another, there is at any instant one joint. That does not move but acts as a centre of rotation. Mapping of several of these instant centres at successive motion yields instant centre pathway. In a normal knee, this is a semicircular and located in the femoral condyle.

According to Muller, knee motion involves both sliding and rolling wherein both tibia and femoral contact points change as femur rolls on the tibia. He, by his 4 bar crossed linkage guides proposes that rolling – gliding ratio is approximately 1:2 during early flexion which decreases to 1:4 by end of flexion. This ratio of gliding to rolling is not constant and is controlled by both anatomy of joint surfaces and by cruciate ligaments (by Segal and Jacod).



Butler et al

ACL provides 85.1% plus/minus 1.9% restraint to anterior translation at 90° of flexion which increased slightly at 30° of flexion. Once ACL is removed, ITB, mid lateral and medial capsule contributed 20 and 25% of restraining forces and MCL and LCL contributed 12%-17%. PCL provides 94.3% plus/minus 2.2% restraint to posterior translation at 90° flexion and similar results at 30° flexion. After sectioning PCL, Popliteal and posterolateral capsule contributed > 50% with MCL 15% and LCL 6% restraint.

Applied Bio-Mechanics

The method for defining the geometry of conventional condylar is to use different radii for different parts of an arc. In sagittal view most of the TKR designs take an average between lateral and medial profiles of natural knee. But it is necessary to preserve a lateral to medial difference to obtain differential rollback in early flexion. If distal to proximal radius is reduced the flexion increases. Another important parameter in geometry is the PDTA – posterior distal transition angle. It is an angle subtended between the large distal anterior radius and smaller distal posterior radius on the femoral component in sagittal plane. If this is 20 degrees or more, the larger distal arc will come in contact with the tibia reducing the contact stress. Replicating the normal geometry of normal knee ends up in high rotational constraint causing digging of the outer edges. The solution to this in total condylar design was done by double dish geometry, where the surfaces are partially conforming in sagittal and frontal planes. This provides a reasonable laxity and rotation and hence no digging in. The disadvantage of this design of total condylar design is

that bottom of tibia dish locates centrally in sagittal plane and hence the contact point is not sufficiently posterior thereby decreasing the flexion to only about 90° .

During flexion – extension moment the net Joint Reaction Force (JRF) is same as that of normal knee joint. This JRF load line must lie perpendicular to the point of contact. Whereas in a replaced joint deviation from perpendicularity is acceptable. Upto 8 degrees of angle of inclination of JRF doesn't require cruciate ligament load to equilibrate. Whereas angular deviation more than 8 degrees result in load application by the cruciates. Hence PCL retaining designs may not have such problem of load line. But in PCL sacrificing design the angle of JRF transmitted will be around 22 degrees to the tibia axis. This could be solved by 22 degrees inclination of tibia component, which is not possible. But designing a central post of posterior stabilizing design can offset this problem.

The contribution of articular geometry in carrying out various forces and moments with optimal laxity and constraints have been studied. The condylar TKR's of low constraint require PCL intactness and flat to curved surface. For a moderate constraint a sagittal tibia radius has to be 60-80mm shallow concave to convex. For high constraint the sagittal tibia radius has to be <60mm and surfaces should be highly anatomical.

MATERIALS

This study was conducted at Nathan Super Speciality Hospital, Salem.

Study period in the year January 2010 to December 2010.

Patient Demographics from January 2010 to December 2010, a total of 21 patients who underwent total Knee Arthroplasty in 22 Knees at Nathan Hospital, Salem were included in this study. Patients with Osteo Arthritis Knee were selected.

Posterior stabilized design were used.

The patients included were those who had standard indications for TKA as shown in the table.

No. of Patients	:	21
No. of Knees	:	22
Average Age	:	55
Average Weight	:	61 Kg
Side left	:	7
Side Right	:	14
Bilateral	:	1

Assessment

Retrospective data collection was done through patients records which contained all the details including the pre operative assessment of the knee in K.S.K.S. score sheet. Assessment and evaluation was done using regularized custom made protocol which included the symptoms of the patients, associated medical conditions. Knee Society Knee Score, Knee Society Functional Score. WOMAC (Western Ontarid and McMaster's Univiersity Osteo Arthritis Index)

Questionnaire

The Knee Society Knee Score (K.S.K.S) 101 SA Special Score which has been widely accepted as an Objective measure of Knee status in patients undergoing total Knee Arthroplasty since its inception in 1989.

K.S.K.S. Proforma is Enclosed

It consists of Knee Score (100 points), the Knee Functions Score (100 Points).
A class fiction system for patients with associated medical conditions.

Score Between

100 – 85 Points	:	Excellent
84-70 Points	:	Good
69-60 Points	:	Fair
<60 Points	:	Poor Results

The Women Score (Western Ontarid And McMaster's University Osteo Arthritis Index).

A disease specific measure on pain, Stiffness and function to be completed by the patient (NONEO, MILDI, Moderate 2 Severe 3 Extreme 4). Higher score indicates disease severity and improvement is indicated by a decreasing score.

WOMAC Proforma Enclosed

The Knee flexion is measured using Goniometer. The pre-operative evaluation and assessment is done all the data are entered in the protocol proforma. X-

Rays included antero posterior and lateral views of the Knee Post Operative X-Rays were taken.

Alignment of Knee

- Varus Knee
- Average Varus Knee
- Valgus Knee
- Average Valgus Knee
- Average Knee Score
- Average Functional score
- Rom Flexion
- FFD

Average WOMAC

Pre-operative assessment were done for all patients. All the patients were assessed and conditions were recorded.

- Pain Swelling
- Rom Knee
- Any FFD
- GAIT
- Whether she can climb upstairs
- Sitting in the floor
- Squatting

Pre- operative period physical modality treatment were given

- GAIT Training
- Flexion & Extension exercises for Knees
- Quadriceps exercise in static cycling were given.

Total Knee Replacement surgery under Spinal and Epidural anaesthesia.

2 Senior surgeons performed the surgery for the cases.

Post operative protocol

Following post operative protocol was followed for the patients.

Day -1 Quadriceps

Strengthening exercise as permitted by the pain.

Day -2

Epidural was removed and patient was encouraged to stand weight bearing with walker support. Active assisted flexion as tolerated by the patient was encouraged.

Day – 5 to 7

Active Knee mobilization in encouraged along with Ambulation.

Day – 14

Suture removed and quadriceps strengthening exercise, knee flexion beyond 90. Most of the patients avail a physiotherapist at home for physiotherapy.

Post operative Assessment

Post operative assessment were also done to evaluate the improvement of function of the knee.

- Pain
- Rom
- Climbing Stairs
- GAIT
- Sitting chair

Follow – up

Post operative follow up is at 1 month, 3 months, 6 months, & 1 year and yearly thereafter.

OBSERVATION AND RESULTS

Out of 21 patients who underwent T.K.R. in 22 knees (one case Bilateral) in were available for complete follow up.

1. All the patients were able to walk freely without pain.
2. 15 patients were able to climb stairs without difficulty.
3. 2 Patients were able to climb with Minor strain.
4. R.O.M. of knee 0-100 for 15 patients.
5. R.O.M. of knee 0-90 for 5 patients.
6. R.O.M. of knee 0-60 for 1 patient.

COMPLICATIONS

One case developed superficial wound infections, which subsided with debridement and Antibiotics.

One case developed deep vein Thrombosis 2 weeks after surgery and was treated with Warfarin for 1 week and Asymptomatic.

2 cases had knee stiffness (Flexion 45). They underwent manipulation of the knee under Anaesthesia and the knees were mobilized with CMP at subsequent follow up.

They had 0-90 and 0-70 R.O.M.

DISCUSSION

TKR has been accepted line of treatment Total Knee Replacement in Chronic Osteo Arthritis is undertaken where conservative line of treatment does not give full relief to patients.

Even in serve cases of Osteo Arthritis Knee, first we try conservative of treatment. In some cases patients were quite satisfactory with the outcome of treatment.

Those cases were not taken for Total Knee Replacement or the Surgical Treatment is postponed for later date if necessitated.

The conservative line of treatments are:

1. GAIT Training (both inside and outside parallel bars)
2. Quadriceps strengthening exercise (Static cycling).
3. Heat Treatment (Way bath).

Out of 33 cases we have continued above treatment, the result was good in 12 cases. Only 21 cases we have taken for Total Knee Replacement as conservative line of treatment did not give desirable relief.

INDICATIONS FOR TOTAL KNEE ARTHROPLASTY

The primary indication is to relieve pain caused by arthritis. Secondary goals to restore functions and correct deformity. Candidates should show degenerative changes on radiographs and have failed other non-operative methods (and occasionally other types of operative care).

Non operative modalities may include Antiinflammatory medications, assistive devices, weight loss, behavior modification oral and intra – articular chondro protective agents and intra articular corticosteroid injections. In select cases surgical options before total knee arthroplasty include arthroscopy and osteotomies.

SURGICAL PROCEDURE

The primary indication for TKR is to relieve pain caused by severe arthritis with or without significant deformity. Patients ideally suited for this procedure are elderly, more than 65 years with modest functional demands, with failed non-operative treatment and are not candidates for alternate procedures. However, it is also indicated in younger patients with multiple joint arthritis with limited functions.

Relative contraindications are numerous and debatable:

1. Medical conditions non compatible with anesthesia/ wound healing /rehabilitation.
2. Monoarticular disease in young patient.
3. Patients with excessive /occupational demands.
4. Skin conditions such as psoriasis -1, 0-20% infection rate.
5. Neuropathic arthropathy
6. Morbid obesity.
7. Recurrent UTI
8. History of osteomyelitis in proximity of knee.

Absolute contraindication

1. Recent or current knee sepsis/remote source of on going infection.
2. Extensor mechanism deficiency
3. Recurvatum deformity – secondary to muscular weakness.

4. Painless well functioning knee arthrodesis.

Surgical Approaches

Anterior midline incision is the most common incision used. If multiple incision scars are present the most lateral should be used because the blood supply to the skin of the anterior knee tends to come predominantly from medial side.

The standard retinacular incision is a medial parapatellar retinacular approach. The medial skin flap should be maintained as thick as possible by keeping the dissection just superficial to extensor mechanism.

In the subvastus (southern) approach, the origin of vastus medialis is lifted off the medial intermuscular septum to approximately 10cms proximal to the adductor tubercle.

Keblish has advocated the lateral parapatellar retinacular incision in patients with valgus knees. This improves the visibility of structures to be released at the time ligamentous balancing.

Extensile approaches like Coonse and Adams modified by Scott and Siliski (quadriceps tendon procedure)/ insall's snip/whiteside and Ohi (tibia tubercle osteotomy) are mainly used for revision surgeries.

There are two schools of thought about the surgical technique:

1. The gap technique (insall) was developed in conjunction with design of cruciate substituting prosthesis.

2. The measured femoral and tibia resection or joint line technique. These two techniques are distinctly different in that the rotational alignment in measured resection technique is based on bony land marks and in gap technique on ligamentous tensioning in flexion. Both techniques require some modification and judgment in knees with significant deformities caused by posterior femoral deficiency, ligamentous contracture or laxity. Current total knee systems use one of these techniques or with increasing frequency a combination of two in more difficult knee reconstructions.

Flexion extension gap techniques: Was developed by Freeman and refined by Insall involves making femoral and tibia cuts so that both flexion and extension spaces and gaps are rectangular and roughly equal in size. The terminal collateral ligaments and associated supporting structures form the medial and lateral constraints of flexion and extension gaps. The flexion gap is determined with knee in 90 degrees of flexion and extension gap with knee in full extension.

Disadvantages of gap technique include:

- a. The joint line (referenced from the femur) may be moved proximal. This happens when there is flexion contracture or chosen femoral component is smaller than the AP dimension of the femur.
- b. Mid range laxity may occur other than in 90° flexion and extension.

Currently a modified gap technique has elements of both gap and the measured resection methods. The summary of modified gap technique:

Femoral preparation is done initially as follows:

1. Balance ligaments
2. Establish proper femoral rotation (using transepicondylar axis)
3. Cut anterior and posterior femur.
 - (a) Posterior referencing (1) 3- degree flexion cut and (2) correct preoperative flexion contractures by posterior release.
 - (b) Anterior referencing recut femur if downsizing leads to over resection of femur.
4. Choose femoral component (downsize for in between sizing)
5. Make proximal tibia cut
6. Reassess ligament balance
7. Adjust distal femoral cut to match the flexion and extension gaps.

Tibia preparation is performed initially as follows:

1. Balance ligaments
2. Cut 10mm from proximal tibia
3. Balance with tensioner
4. Cut distal femur 10mm
5. Rotate femur
6. Cut anterior and posterior femur.

Measured resection technique: It relies on accurate reconstitution of pre morbid distal and posterior dimensions of the femur and intact PCL and the

ability to balance associated soft tissue structures with minimal joint line elevation. It differs from gap technique primarily determining the rotation of the femoral component and method of determining the thickness of the posterior femoral cuts.

Intramedullary and extramedullary instrumentation in femur and tibia is of surgeon's choice or dictated by the regional pathology of the bones. On the tibial side extramedullary alignment instrumentation is of routine use. Whereas, on femoral side it is the intramedullary device.

Ligamentous balancing It must be performed in concern with bone surface preparation. Preliminary releases should be performed during exposure of the knee to allow proper determination flexion extension gaps and femoral component rotation. Further during examination of flexion extension gaps/during component trial reduction/ after final component implantation. As a general guide 1-2mm of balanced varus –valgus play in prosthetic is a reasonable goal. Slight residual varus laxity in extension is believed to be better tolerated than valgus laxity because the dynamic stabilizing effect of the iliotibial band.

Varus deformity Release of deep MCL of the tibia to posteromedial corner of the knee and the attachment of semimembranosus aponeurosis. The proximal 3-5 cms of the subperiosteally released. It elevates superficial MCL and pes anserinus insertions in continuity with the periosteum of tibia. Osteophytes on both femur and tibia, which are tenting the soft tissue sleeve, must be removed. In greater degrees of deformity the PCL and posteromedial capsule may

require release. For severe medial contractures with or without lateral attenuation the periosteum of the tibia can be stripped distally an additional 4-5cm fractionally severing the periosteum.

Valgus deformity During exposure the lateral capsule is released from the tibia. In lesser degrees of deformity adequate balance can be obtained by release of IT band at the level of the joint line, sometimes up to 10 cms proximal. With greater degree LCL stripped off the lateral condyle along with severing of popliteus tendon. The PCL may act as a central and may require lengthening or release. When associated flexion is present, posterolateral capsule and lateral head of the gastrocnemius must be stripped of femur. Rarely release may go up the lateral intermuscular septum. Very rarely release or lengthening of the biceps tendon may be required. In extreme corrections of varus and valgus deformities, instability factor must be kept in mind and in such situations constrained prosthesis of appropriate size must be used.

Flexion contracture Small flexion contractures can be reduced by removal of posterior osteophytes and elevation of posterior capsule. For moderate to severe contractures posterior capsulotomy is the preferred method and should be performed with the knee flexed. In severe cases, capsule must be separated from the collateral structures by making vertical incisions at the medial and lateral corners. Resection of the PCL is most likely necessary in this situation. Posterior capsular release should be done after the bone cuts when the posterior visualization is good. If extension is still not complete further bone

may be removed from distal femur. The need to fully correct FFD at the time of surgery is questionable.

PCL Balancing It is done in stepwise fashion with frequent testing of PCL tension. First the PCL is released from the superior surface of the bone island on tibia.

Next – the PCL is released subperiosteally in 1-2mm intervals along the posterior surface of the tibia. The PCL bone island can be partially or completely removed. If partial release is not successful in balancing the PCL, the posterior slope of the tibia can be increased upto 7° more commonly, a small femoral component can be used to enlarge the flexion gap relative to the extension gap.

When it is difficult to balance the PCL or with PCL incompetence, current knee systems allow intraoperative conversion into PCL substituting design.

Cementing technique Adequate lavage used to remove blood, fat, and debris and cleaned properly to permit better penetration of cement into cancellous bone. Cement generally used in doughy tactile state and manually pressurized. Ideal cement penetration into bone is 1-2mm. Caution should be exercised in rheumatoid bone where deeper penetration may occur. Sclerotic surfaces may be drilled not more than 1-2mm because deeper penetration transfers bone cement interface away from the tibia surface where bone strength tends to be less. In revision, cement removal results in excessive bone loss.

FUNCTIONAL OUTCOME AFTER TOTAL KNEE REPLACEMENT

IN SOUTH INDIAN WOMEN

FINAL CONCLUSION

Common complaints of women in Osteo Arthritis Knee are:

1. Pain
2. Difficulty in walking
3. Swelling of Knee
4. Deformity
5. Unable to climb stairs
6. Unable to get up from Western toilet
7. Disturbance to sleep (due to intermittent pain)
8. Most important factor Psychological factor

If all the above factors are corrected to a reasonable extent, one can say that functional outcome after total knee replacement is satisfactory.

PAIN

In Osteo Arthritis Knee the extent of pain should be assessed pre operatively. The Time, Duration, Type of Pain (Mild, Moderate, Severe) should be recorded. Then only we can assess the same in the post operative period and during the follow up of the case.

This assessment is one of the very important factors for functional out come. The general condition of the patient should also be assessed before coming to a conclusion.

Pre operative assessment and post operative assessment will give clear picture regarding pain.

Functional outcome is good or satisfactory if there is no pain or if it is negligible.

FUNCTIONAL OUTCOME AFTER TOTAL KNEE REPLACEMENT

IN SOUTH INDIAN WOMEN

FINAL CONCLUSION

GAIT – Difficulty in walking.

Difficulty in walking is one of the common complaints among Osteo Arthritis patients.

In the early stage the patient feel pain if they walk long distance and in uneven ground.

In due course the pain is felt even if patients walk short distance. In severe cases even few steps cause severe pain. This is Pre operative condition.

In the Post operative period the patient is given GAIT training in inside bar, outside bar and Quadriceps strengthening exercise.

In about one month the GAIT, walking pattern is assessed. Majority of the patients walk short distance without pain and difficulty. This is one of the Functional outcome after total knee replacement. Very few patients are able to walk for about 1 km without difficulty. In negligible percentage of patients the GAIT and walking are not satisfactory. There may be other medical causes such as over weight, old age, cardiac conditions etc.

FUNCTIONAL OUTCOME AFTER TOTAL KNEE REPLACEMENT

SWELLING

One of the common complaints is Swelling of Knee joint.

Almost all patients complaint of Swelling in the Knee joint.

In the early stage the Swelling is mild. In due course Swelling increases considerably.

During pre operative period wax bath is prescribed. Ultra sound and short wave diathermy also help to reduce the swelling.

In the post operative period there may not be swelling or it will be very minimal and in due course it will subside.

This is one of the functional outcome after total knee replacement.

FUNCTIONAL OUTCOME AFTER TOTAL KNEE REPLACEMENT

DEFORMITY

Deformity is quite common in Osteo Arthritis Knee. Certainly it affects the GAIT of the patient. Due to aging process mild deformities such as Varus deformity of Knee and Restriction of R.O.M. of Knee are acceptable one. But when the deformity increases and R.O.M. is restricted it affects GAIT.

Total knee replacement corrects the deformity maximum extent. So the GAIT is normal or near normal. GAIT can further be improved by giving GAIT training inside and outside parallel bars.

So the functional outcome is Good.

FUNCTIONAL OUTCOME

CLIMBING THE STAIRS

In the Post operative period after GAIT training and strengthening Quadriceps Muscle, necessary training should be given to patients to climb stairs. In the beginning it is advisable to the patients to climb stairs with the support of Physiotherapist or patients relative. The process of climbing stairs gradually increased to maximum 1 to 2 floors only. Over exertion should not be allowed. After patient gains confidence she can climb stairs slowly independently.

It will give satisfaction to the patient.

In some cases due to very old age and who are suffering from other medical causes such as Heart & Respiratory Diseases, should not be insisted to climb stairs.

Otherwise functional outcome is good after total knee replacement. Mobility is life. Life is mobility.

GET UP FROM WESTERN TOILET

In the post operative period patient is trained to use Western toilet. Sitting and getting from toilet may cause pain. In some cases Range of movement of knee may be restricted.

So patient may find it difficult to use toilet.

Gait training, strengthening of quadriceps muscles by exercises improve range of movement of knee.

Range of Movement of knee (by quadriceps exercises in static, cycling), will help the patient. She can use western toilet easily in due course.

This is functional outcome after total knee replacement.

DISTURBANCE TO SLEEP (DUE TO INTERMITTENT PAIN)

Majority of Osteoarthritis knee patient complaints of intermittent pain during sleep.

It disturbs patients sleep.

In the post operative period quadriceps strengthening exercise and regular exercises are given to knee.

In due course intermittent pain during sleep subsides.

This is functional outcome after total knee replacement.

PSYCHOLOGICAL FACTOR

Psychological factor play major role in the management. Functional outcome after total knee replacement.

Proper counseling is essential for the above patients. When they find that their movements are restricted due to osteoarthritis knee, the patient is depressed which is natural. We should encourage the patient with frequent counseling.

Gait Training inside and outside parallel bar should be given in the post operative period also.

Within one month patient show improvement and walk short distance without much difficulty. This is functional out come after total knee replacement.

KEY POINTS – GENERAL REHABILITATION PRINCIPLES FOR
OSTEOARTHRITIS OF THE KNEE.

- (1) Non weight bearing strengthening exercises should be emphasized particularly on the quadriceps muscle group.
- (2) Hydrotherapy provides the appropriate environment in which knee osteoarthritis patients can exercise at intensities that improve strength and mobility.
- (3) Exercise load should increase each week and maintenance of cardiovascular conditioning is a must even before a total joint replacement.
- (4) Evaluation of activities of daily living is essential and should include evaluation for assistive devices to maximize independence and ensure safety in the home environment.

MOBILITY AIDS

Generally total knee replacement patients can walk without any mobility aids.

That is our aim.

But in old patients and patients with other medical problems (such as cardiac, respiratory etc) should not strain much.

Walking stick is prescribed to old patients. It will give confidence to the patients.

In rare cases tripod or quadripod can be prescribed according to the condition of the patients.

Each case should be assessed individually and prescription is tailor made and not ready made.

ARCHITECTURAL BARIERS

Necessary advice should be given to the patients regarding modification in the house

- (1) Floor should not be slippery
- (2) Western toilet should replace Indian toilet.
- (3) Flexible tap should be fixed
- (4) There should not be much up and down from 1 room to another room.
- (5) Kitchen should be modified so that she can sit and cook.
- (6) Conventional type of cooking (sitting in the floor) should be avoided. She should not squat.

REHABILITATION

Without rehabilitation the treatment is not complete.

As far as possible the patient should be back to original vocation.

In our series majority of patients are house wives.

One patient is Elementary School Teacher and another patient is Ayah in a Noon meal centre.

The teacher is advised to restrict standing posture for longer time. We have advised her to take up desk work (Clerk). The employer was also suitably informed to give her alternate job.

The Ayah was asked to modify the kitchen so that she can sit and do cooking. The kitchen table is suitably modified and separately constructed in the kitchen if necessitated. The authorities were also suitably informed.

KEY TO MASTER CHART

C	Case Number
IP	In Patient Number
Side	LT –Left RT – Right BL-Bilateral
KSKS	Knee Society Knee Score
FUNC	Functional Knee Score
ROM	Range of Motion
FFD	Fixed Flexion Deformity

MASTER CHART

S.NO.	IP NO	AGE	WEIGHT	SIDE	DATE
1	1102	48	54	Right	08.05.2010
2	1192	46	63	Bilateral	27.05.2010
3	1234	45	57	Left	04.06.2010
4	1253	45	54	Left	08.06.2010
5	1274	65	59	Right	13.03.2010
6	1282	48	53	Right	13.06.2010
7	1332	50	52	Right	28.06.2010
8	1337	50	55	Right	28.06.2010
9	1349	60	60	Right	25.06.2010
10	1354	68	61	Right	03.07.2010
11	1355	54	59	Left	08.08.2010
12	1461	64	61	Left	17.07.2010
13	1486	45	49	Left	11.08.2010
14	1512	33	68	Right	29.07.2010
15	1533	50	55	Right	07.08.2010
16	1609	60	61	Left	24.08.2010
17	1623	65	57	Right	26.07.2010
18	1631	63	61	Right	03.07.2010
19	1676	55	53	Left	16.09.2010
20	1677	40	62	Right	16.09.2010
21	1847	50	53	Right	25.06.2010

PRE-OPERATIVE

IP	VARUS	VALGUS	KSKS	FUNC	ROM	FFD	WMAC
1102	15		50	40	120	0	44
1192	10		15	40	100	0	41
	10		5	40	100	0	41
1234	10		47	40	110	0	33
1253	15		14	20	80	10	40
1274	10		9	0	90	10	60
1282	10		9	0	20	20	20
1332	12		26	10	83	12	74
1337	12		54	50	113	12	34
1349	15		50	40	120	0	44
1355	12		53	40	80	20	44
1461	30		30	15	75	15	65
1486	16		7	15	75	25	23
1512	15		20	40	85	10	50
1533	15		20	40	85	10	50
1609	15		15	10	85	5	57
1623	16		0	10	95	15	43
1631	30		30	15	75	15	65
1676	15		10	40	85	5	50
1677	15		59	50	120	0	28
1847	7		4	10	80	10	70
1354	20		59	50	120	0	28

POST OPERATIVE

IP	VARUS	VALGUS	KSKS	FUNC	ROM	FFD	WMAC
1102		4	88	70	95	5	0
1192		3.5	100	84	100	3	3
1234		3	84	74	100	0	12
1253		4	95	80	90	0	10
1274		4	88	100	90	0	10
1282		6	99	75	20	0	5
1332		6	90	80	100	0	7
1337		4	100	80	100	0	10
1349		4	88	70	95	5	0
1355		3	95	100	100	0	3
1461		4	98	85	115	0	5
1486		4	75	80	88	5	6
1512		4	75	90	100	7	7
1533		5	98	70	105	0	0
1609		4	92	60	110	0	8
1623		4.5	100	80	105	0	0
1631		0	98	85	115	0	5
1676		4	88	115	115	0	6
1677		5	90	85	115	0	5
1847		4	75	90	115	5	7
1354		5	90	85	115	0	5



MURUGAMMAL CLINICAL PHOTO

I.P. No. 1332



MURUGAMMAL PRE OPERATIVE X-RAY

IP No. 1332



MURUGAMMAL POST OPERATIVE PHOTO.

I.P. No. 1332

A7 A8



MURUGAMMAL POST OPERATIVE X-RAY.

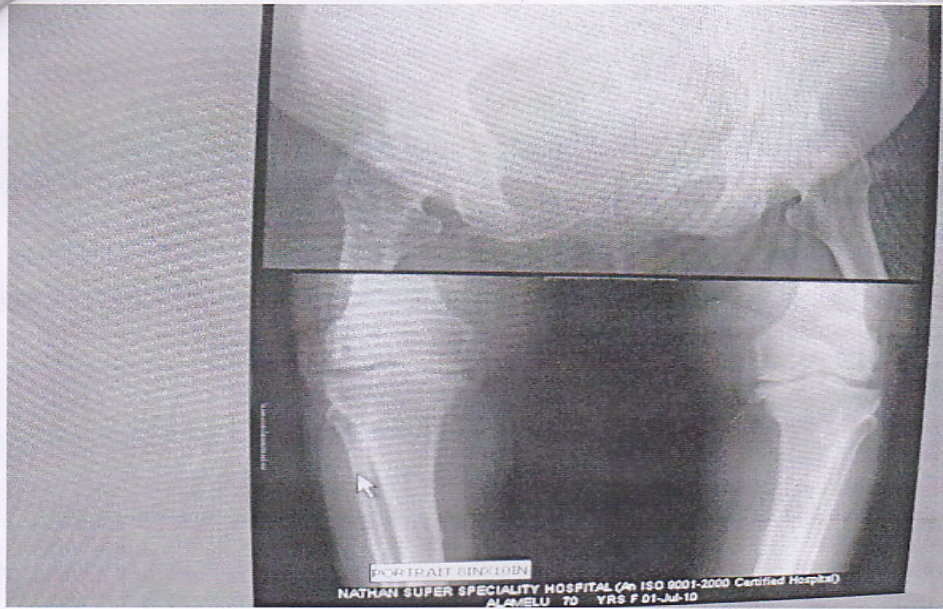
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ALAMELU CLINICAL PHOTO.

I.P.No.1354

49



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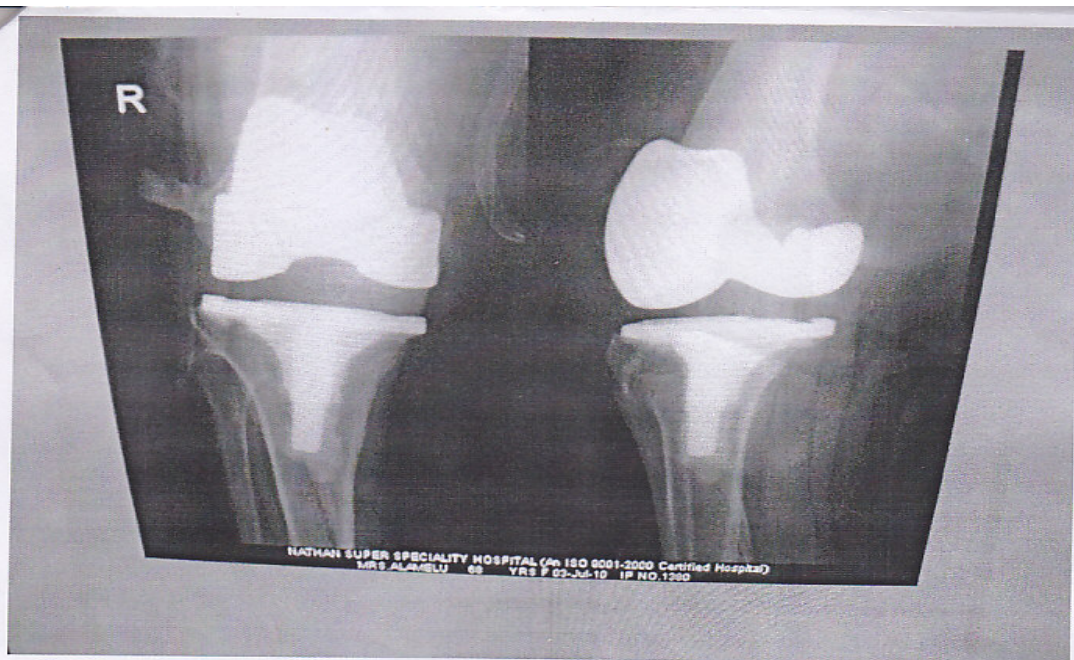
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50



ALAMELU POST OPERATIVE PHOTO.

IP.No.1354



ALAMELU POST OPERATIVE X-RAY.

IP NO. 1354

ALAMELU CLINICAL PHOTO

IP NO. 1354

52



KANTHA CLINICAL PHOTO.

IP. No 1349

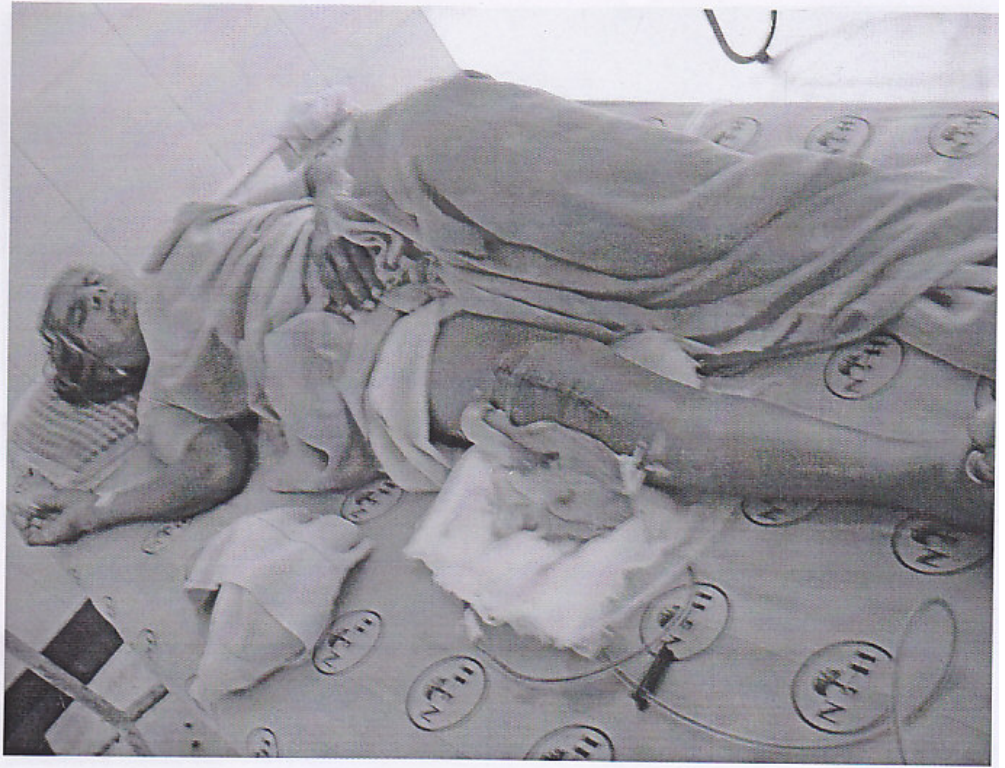
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KANTHA PRE OPERATIVE X-RAY.

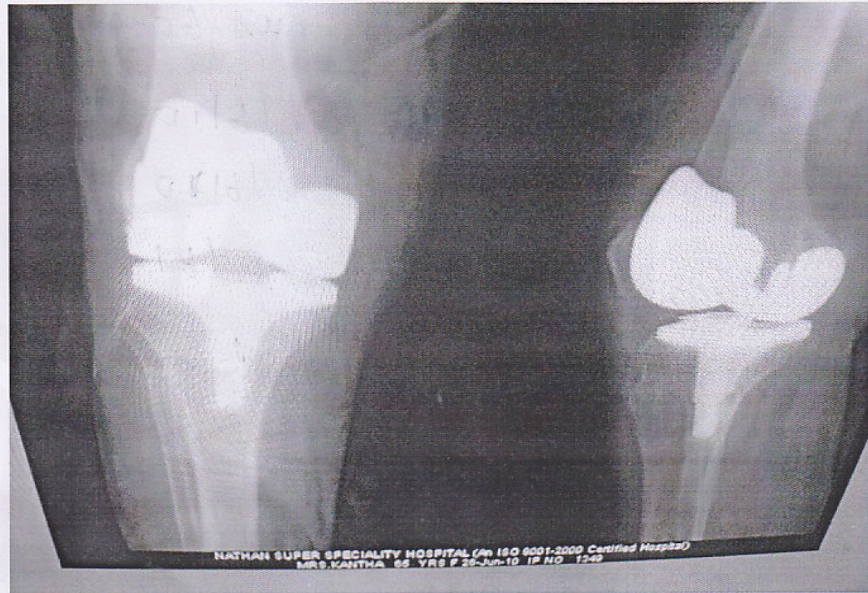
IP. No. 1349

54



KANTHA POST OPERATIVE PHOTO.

IP.No.1349



KANTHA POST OPERATIVE X-RAY.

IP.no.1349

THE WOMAC QUESTIONNAIR

NONE	MILD	MODERATE	SEVERE	EXTREME
0	1	2	3	4

POST OP

		PRE OP				
SECTION A (PAIN)						
How much pain do you have?						
•	Walking on flat surface					
•	Going up or down stairs					
•	At night while in bed					
•	Sitting or lying					
•	Standing upright					
SECTION –B (STIFFNESS)						
How severe is your stiffness after wakening in the morning?						
How severe is your stiffness after sitting, lying, or resting later in the day?						
SECTION (FUNCTION)						
What degrees of difficulty do you have with.....						
•	Descending stairs?					
•	Ascending stairs?					
•	Rising from sitting?					
•	Standing?					
•	Bending to floor?					
•	Walking on flat surface?					
•	Getting in/out of car?					
•	Going shopping?					
•	Putting on socks/stocking?					
•	Taking of socks/stockings?					
•	Rising from bed?					
•	Lying in bed?					
•	Sitting?					
•	Getting in/out of bath?					
•	Getting on/off toilet?					
•	Heavy domestic duties?					
•	Light domestic duties?					
TOTAL SCORE						

KSS- KNEE SOCIETY SCORE SHEET

Name:

Operative Date :

		LEFT						RIGHT					
	Score	Pre	3Mo	6Mo	1 Yr	2 Yr	4 Yr	Pre	3Mo	6Mo	1 Yr	2 Yr	4 Yr
PAIN Name.....	50												
Mild or OCC...	45												
Stairs only.....	40												
Walking & Stairs	30												
Moderate OCC.....	20												
Cont.....	10												
Severe	0												
ROM(5° = 1 Point).....	25												
Stability(max mov any POS)													
A/P <5mm	10												
5-10mm	5												
10 mm	0												
M/L <5°	15												
6-9°	10												
10-14°	5												
> 15°	0												
Total													
Deduction (minus)													
FLEXION CONTRACTURE													
None.....	0												
5-10°.....	2												
10-15°.....	5												
16-20°.....	10												
>20°.....	15												
EXTENSION LAG													
None.....	0												
<10°.....	5												
10-20°.....	10												
>20°.....	15												
ALIGNMENT													
5-10° None.....	0												
0-4°(3pt each deg)													
11-15°(3pt each deg)													
Other.....	20												
Total Deduction.....													
KNEE SCORE													
(it total is a minus, score is zero)													
FUNCTION													
WALKING unlimited.....													
>10 blocks.....	50												
5-10 Blocks.....	40												
< 5 blocks	30												
House bound.....	20												
Unable.....	10												
	0												
STAIRS Norm up and down.....	50												
Norm up 3xDown Rail.	40												
Up an Down Rail....	3E+08												
Up rail unable down..	15												
Unable....	0												
TOTAL													
Deductions (minus)													
Cane.....	5												
Up rail unable down..	10												
Crutches/Walker	20												
Total Deductions....													
FUNCTION SCORE													

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